submitted by

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approved by

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may 25, 1953 head of department

A S M A L L H O U S E

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undergraduate thesis · bachelor of architecture · w wenner smith II

Graduate House, M.I.T.
Cambridge 39, Mass.
May 25, 1953

Office of the Dean
School of Architecture and Planning
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Dear Dean Belluschi,

I hereby respectfully submit my thesis, A Small House, in partial fulfillment of the requirements for the degree of Bachelor of Architecture.

Sincerely,

W. Wenner Smith, II

A C K N O W L E D G M E N T S

To Professors Chermayeff, Brown, Gelotte, and Dean Belluschi, for their thoughful criticisms of tentative designs; to Mr. Leith Holloway who supplied meteorological data; to the many others who aided me in particular aspects of the problem; and to my client who so patiently gave consideration to a multitude of preliminary plans.

"The more generic its background, the less obtrusive its effect, the more subtly will it (good design) tell its story."

• • • • Lewis Mumford

The Culture of Cities

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the program

GENERAL

John and Jean Smith, a couple in their early thirties, wish to build a house within easy commuting distance of Washington, D. C. For themselves and their daughter (age 3) they hope to achieve a house which meets most of their requirements for $15,000, exclusive of lot. Although they have but one child now they desire a house which can adequately provide for two. It is felt that if the family becomes larger than that, either the children will double up in sleeping quarters through the use of bunk beds, or a new house will be sought. In any event that this house should be expansible was never a consideration.

Mr. Smith is an economist by profession, and immediately following the Second World War worked in Germany for three years and in Japan for two. While in Japan Mrs. Smith studied both watercolor painting and flower arranging, and though she has had little time for those activities in this country, she is still interested in them. At the present most of her time is devoted to sewing, cooking, and running the house. Mr. Smith's hobbies also lie largely in the creative field. Consequently space is desired within the house where such activities, whatever form they take from time to time, can be carried out without disturbing the more formal living area of the house. They have little desire to work extensively on their land; both the exterior of the house and the land should be easy to maintain.

During the course of their overseas travels the Smiths acquired many things - primarily textiles, paintings, and china. These objects are displayed in the Japanese tradi-

tion - not more than several articles are exhibited at a time, and the displays are changed frequently. Thus it is mandatory that space be provided where they can be stored and yet readily accessible, and where they are not subject to extreme changes in temperature.

The Smiths entertain infrequently. When they do, the entertainment commonly takes the form of a dinner, with a young couple like themselves as guests. Small children are usually left at home with a baby-sitter. Those occasions when as many as eight adults get together are rare.

LIVING-DINING

Since their entertainment is in small groups, the living room needs to be only moderate in size. There should be a fireplace, generous wall area for display of objets d'art, and built-in furniture, storage, and bookcases as space permits. It should be visually separated from the entry, which must at least contain storage for outdoor wear. The living room must be inviolate in regards to major traffic patterns from the entrance. The dining area may be part of the living room.

Existing furniture which will be retained:

Living
- sofa bed
- sling chair
- occasional chair
- coffee table
- desk
- table model T.V.
- hi-fi radio cabinent and speaker cabinent

Dining
- large, folding table
- chairs
- 92" buffet

KITCHEN

This must be large and pleasant, as it is to be one of the most important rooms in the house. The client requires that it contain a family area, the core of the house. This area must contain three types of space: (1) a children's play area in contact with the rest of the kitchen and living room with some storage for toys; (2) a place for a sewing machine; (3) a work counter for creative projects. It must be extremely informal; projects may be left strewed about even when the Smiths are entertaining.

The kitchen proper must have room to accommodate the following:

sink with garbage disposal and dishwasher
small refrigerator
small freezer
Thermador-type cooking units and oven
washer
dryer

In addition there should be space for a future ironer, there must be adequate work surfaces, and a snack space for informal meals is requested if possible. The kitchen may be quite open to the living room; in fact the T.V. should be available to some part of the kitchen or family area as well as to the living room. A kitchen door independent of the front door is not mandatory.

SLEEPING

The master bedroom need not be large, but it must have ample storage space, room for a double bed, night tables, and two chairs. It is desired that the children's bedrooms be separated by a folding partition so the rooms can be made one when more space is desired. There should be some tackboard space in each of the two children's bedrooms.

The bathroom ideally would contain a double-basin lavatory and a compartmented water closet; the client feels that the double-basin lavatory is the more important. If there is no linen closet in the hall, there should be some storage space in the bathroom for this purpose.

EXTERIOR

A Carport for one car is required. There should also be an all-weather play area, preferably supervised from the kitchen; this may be the same as the carport. Outside storage, containing children's outdoor equipment, a small amount of garden tools, and bulky items such as trunks, should be provided.

UTILITY

Located somewhere near the center of the house a utility room of minimum dimensions will be required to house a year-round air conditioner, and a water heater.

A SMALL HOUSE

the site

There were two major considerations in the selection of a site. First, it had to be within reasonable traveling time of the business center of the District. This gave a slight preference to suburban Virginia over suburban Maryland, as the business center of Washington lies closer to Virginia than to Maryland. Second, the educational facilities of the community had to be of a high order. In this respect several towns in Virginia which satisfied the other condition were clearly superior, and the lot finally purchased is situated in one of them, Falls Church, Virginia.

Falls Church, located seven miles to the west of Washington, had a population of 7,535 in 1950. It is a young town, having tripled in population in the ten years between 1940 and 1950. It attained the status of an independent city in 1948, giving it the status of a county. It is primarily a white collar residential town; less than five per cent of the employed adults are engaged in industry, and over sixty per cent are government employees. Because of its homogeneity and because it has no substandard residential districts the median annual income of the families living there is by far the highest in Virginia, and one of the highest in the entire South - $5,098 in 1950.[1] Falls Church has a complete governmental system including a city manager and a progressive planning office, and offers all the usual public services, I believe, with the exception of garbage collection.

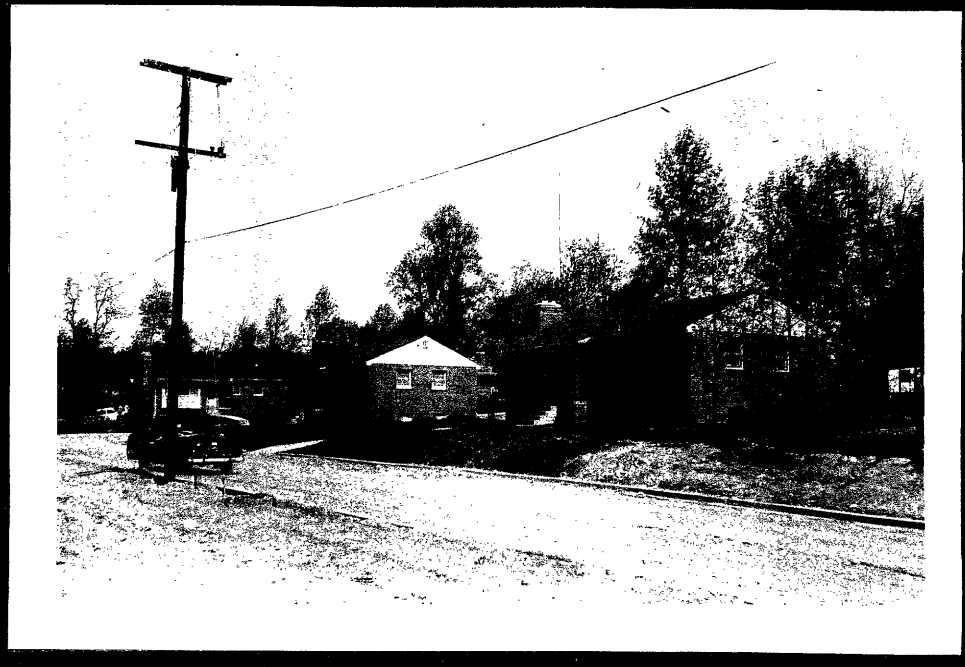
1. U.S. Bureau of the Census, 1950 Population Census Report: Virginia, Number of Inhabitants (P-A46) and General Characteristics (P-B46). U.S. Gov't. Printing Office, 1952.

The lot purchased was one of a subdivision sold to individual buyers, though the majority of lots in the same area were developed by speculative builders. The frontage - 72 feet - is less than the minimum of 75 feet required by Zoning regulations; the subdivider was able to carve an extra lot out of his property by obtaining this relaxation of the Code. The client's lot slopes down 1 in 25 to the rear, is 150 feet deep, and has a 10 foot drainage easement at the rear. A residential street lies on the NE side of the property. Approximately the first 50 feet of the lot is at the present filled level with the street. Being at one time part of a woods, the lot contains very tall, slender deciduous trees, characteristic of much of Falls Church, which completely shade the lot during the growing season. A bus stop, connecting the town with Washington, is two blocks away, and a local shopping center is a half-mile distant.

There are at the present time no houses on the SW side of the street within a block of the client's property, though there are houses across the street. Fortunately not all the builders in the area have been so insensitive to the value of trees as the accompanying photograph indicates, and although the houses leave a great deal to be desired, the effect of the neighborhood with its rolling terrain, large side and front setbacks, curved roads, and homogeneous texture is surprisingly pleasant.

THE SITE

across the street



to the west

to the south

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climate control

Ordinarily a house should be sited so that it receives maximum benefit from the sun and wind, excluding or utilizing either as desired. Since the client's lot contains many trees which completely shade it in summer there was little need to consider the impact of the heat of sunlight when the trees are in leaf. The only part of the lot which sunlight may reach part of the day is the portion nearest the street; building on this section was prohibited in any case by setback requirements. Of course the sun would become important if it were assumed that many tree would have to be cut down to accommodate the house. However the Smiths correctly desired that the character of the land be disturbed as little as possible.

In late fall and winter, when the trees are devoid of leaves, the sun can be an asset if a house is well-planned. But here again it made little difference. From the beginning it seemed most natural to place the house so that the walls would run parallel and perpendicular to the street, as very few houses in Falls Church are placed otherwise. The lot lying SW - NE, it would make little difference if the long dimension of the house faced SE or SW - the same amount of sunlight would fall on both.

From the outset the Smiths, having experienced several Washington summers, felt that year-round air conditioning should be an essential feature of their house. The accompanying graphs and diagrams are the result of an investigation to determine whether comfort conditions could be achieved by less expensive means. The summary is as fol-

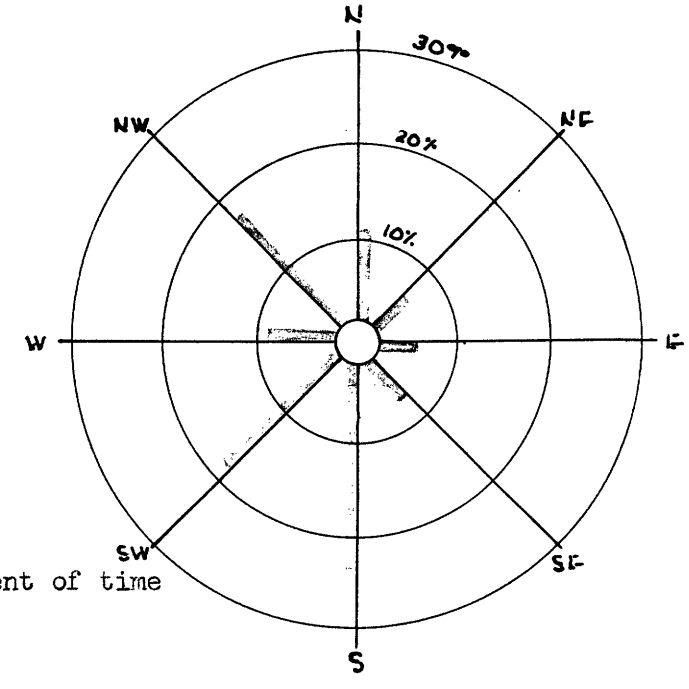
lows:

1. Even if the house were to be oriented to utilize the summer breezes to the fullest extent, the fact that wind movement is extremely slow in comparixon with other East Coast cities makes it doubtful that the available wind could by itself produce comfort conditions.
2. Although the sun at no time of the year dictates the orientation of the house, psychologically it may be of considerable value when it can penetrate to the interior. Thus the optimum location of rooms within the house had to be considered.
3. There are only three comfort hours (as defined by the ASHVE Guide) during a typical July day. Between 11:00 A.M. and 7:00 P.M. the temperature is too high; between 9:00 P.M. and 8:00 A.M. the humidity is too high for comfort conditions to exist. It should be observed that the wind movement is faster when the temperature is highest (during the middle of the day), but that during the night when the humidity is highest the wind contributes little to evaporative cooling.

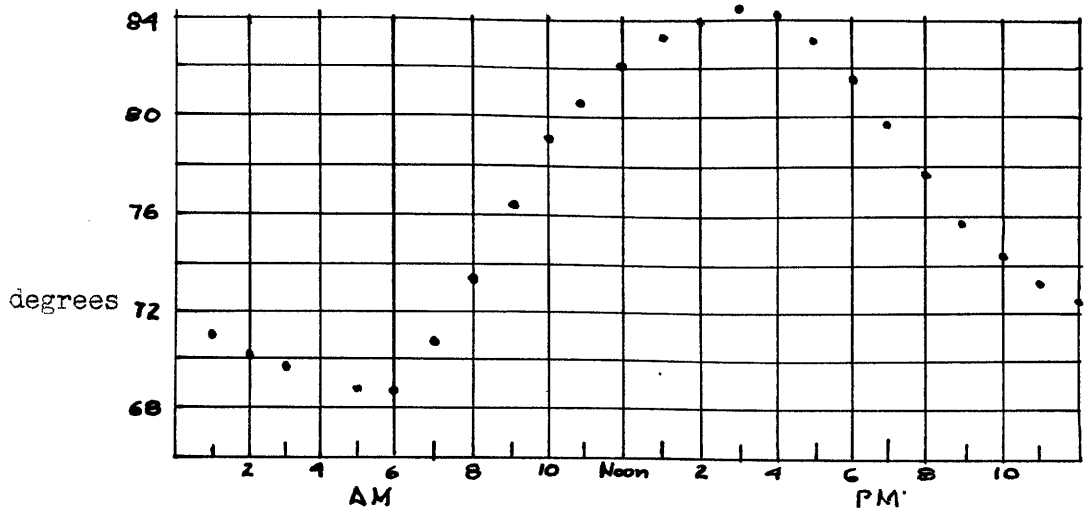
As a result of this survey it has been concluded that summer air conditioning is highly desirable, and the Smiths' house has been designed accordingly.

Boston	12.5 mph
New York	12.5
Philadelphia	9.7
Providence	9.5
Chicago	9.5
Portland, Maine	8.7
New Haven	7.4
Baltimore	7.4
Washington	5.9

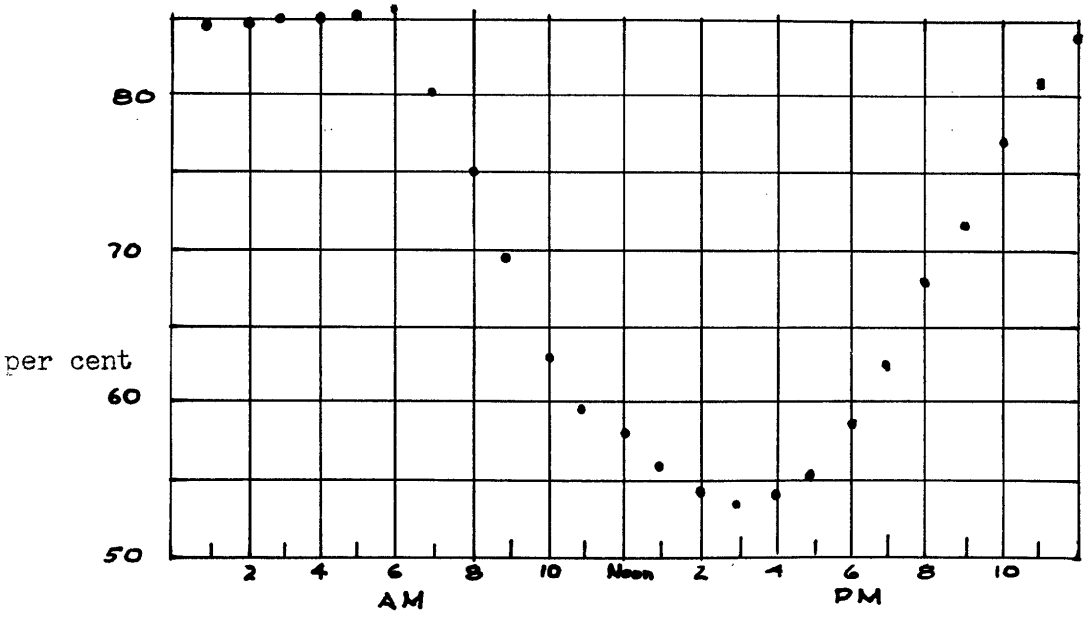
AVERAGE SUMMER WIND VELOCITIES



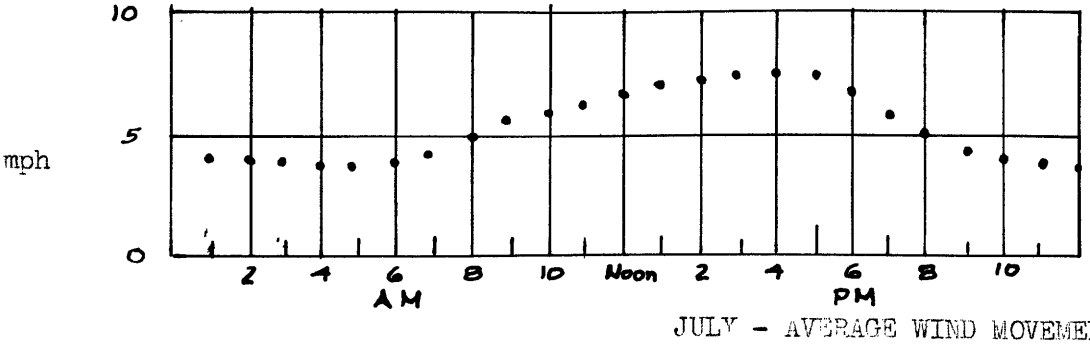
JULY WIND DIRECTION



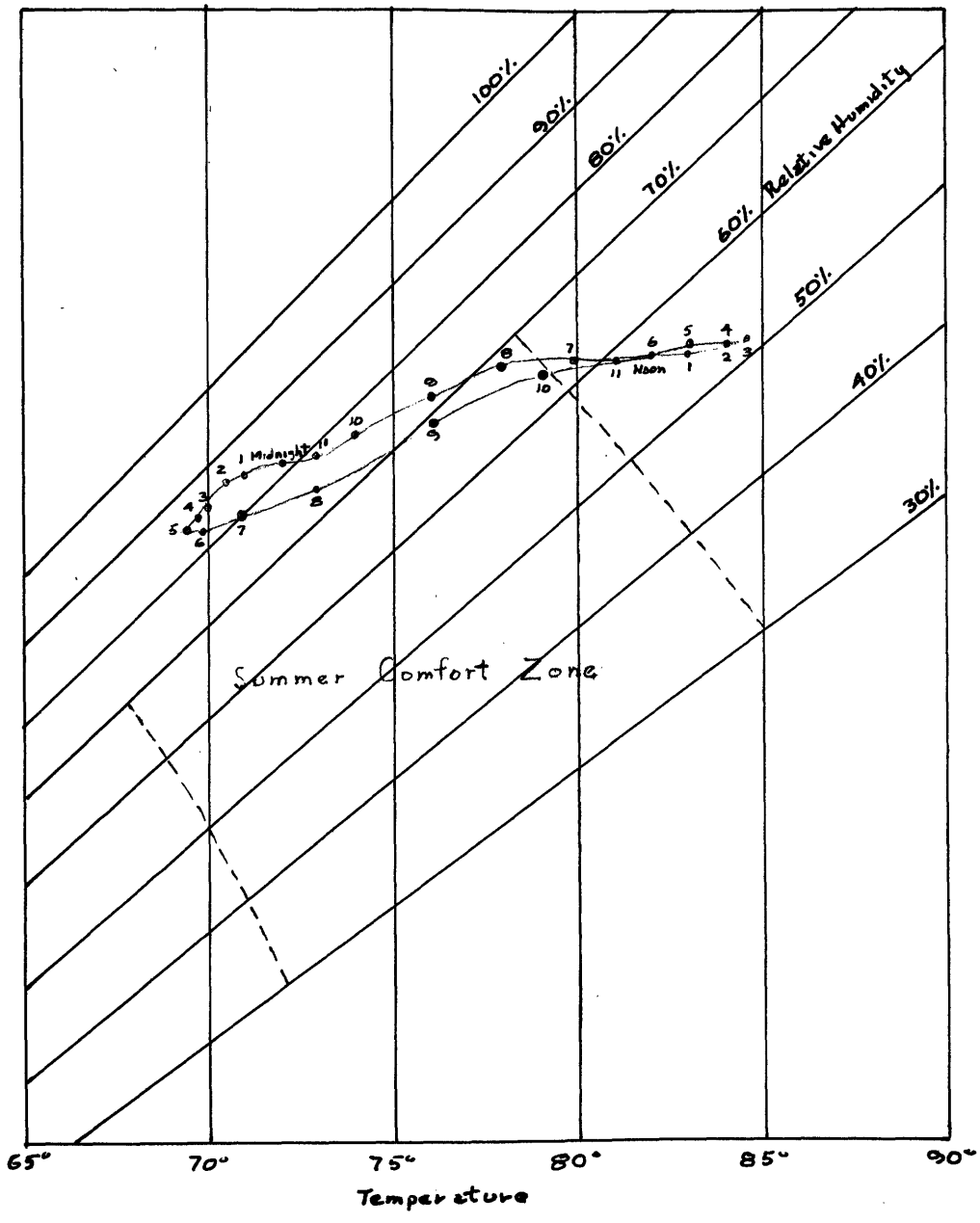
JULY - MEAN HOURLY TEMPERATURE



JULY - MEAN HOURLY RELATIVE HUMIDITY



JULY - AVERAGE WIND MOVEMENT



July mean hourly values of temperature and relative humidity - Washington, D.C.

COMFORT CHART

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short specifications

Foundation walls shall be of concrete, 10" wide except underneath the window wall on the southwest side where the concrete shall be 8" wide. Footings shall be of concrete, 10" deep by 20" wide, as required by the building code. The floor shall consist of a 4" concrete slab reinforced with 6 x 6 - 10 x 10 mesh. It shall be enlarged to accommodate the return air ducts embedded in it and to resist the loads of the bearing partition and fireplace, as shown in the drawings. The slab shall rest on a minimum of 10" of gravel on top of which has been placed a waterproof membrane, and shall be separated from the foundation wall by a 2" thickness of regid insulation which will extent to a depth of 24" below finished grade level.

All exterior walls shall be of nominal 10" cavity brick construction, and shall be left exposed both inside and outside except as noted in the drawings. The cavity shall be filled with Cavity Brick Insulation - Pouring Type. A vapor barrier shall be secured by mopping the inner wythe of brick with water-emulsion asphalt paint, and weepholes and flashing shall be provided at the base of the cavity as detailed.

All ventilation windows shall be of the wood awning type. All fixed glass shall be 3/16" crystal except the southwest window wall which shall be glazed with 1/4" plate.

The roof shall consist of 5 ply built-up roofing covered with white marble chips, and shall be laid on inch sheathing. Between the 16" o.c. roof rafters

(of No. 1 Yellow Pine) shall be placed 3" batt-type insulation with integral vapor barrier. The air space between rafters, above the insulation, shall be vented to the outside by means of screened louvres.

The ceiling throughout the house shall be plaster on perforated plaster board. Partitions shall be of 2" x 4" studs, 16" o.c., covered with either plaster on plaster board, 3/8" plywood, or ceramic tile (in the bathroom), except that the partition enclosing the heater room shall be of 4" gypsum block. All interior wood trim shall be natural birch. The concrete floor slab shall be surfaced with either quarry tile, vinyl tile, or cork, as designated in the drawings.

The air conditioning unit shall be capable of delivering 800 CFM of cooled air and 65,000 BTU/HR warm air. Sheet metal supply ducts shall be located above the suspended ceiling in the hall and above the kitchen cabinents; return air ducts shall be located in the floor slab leading from the exterior edge of the floor slab to a plenum chamber beneath the air conditioning unit.

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building and zoning laws

Pertinent excerpts from:

Building Code, Falls Church, Va., 1947.

page		
18	sleeping rooms	Window area not less than 12 sq ft. At least one-half area will open. Ceiling height at least 7'-6". Minimum width 8', minimum area 80 sq ft.
24	foundations	Foundation walls at least as thick as the walls above them, and of concrete, brick, or stone. Wall 30" below grade, and minimum footing 10" x 20".
25	masonry walls	Not less than 8" thick
34	fireplaces and chimneys	Header, beams, and joists at least 2" from outside face of chimney. Trimmers not less than 8" from inside face of nearest flue. Woodwork at least 8" from top of fireplace openning.
42	flues	Chimneys for low temperatures of brick, solid masonry, or reinforced concrete only, lined throughout with terra cotta. Built on concrete or masonry foundations. Not less than 8" brick around flue lining for chimneys not attacked to external walls in dwelling houses. Chimneys and flues at least 3' above highest point of contact with roof.
35	walls	Load bearing partitions of 2 x 4's or larger, 16" oc.
	live loads	roof load, 30 psf.

Zoning Law - Class A, Residential.

setbacks	25' front, 15' side, 40' rear.
cornices	3' maximum projection on any side beyond setback requirements.
fences	Maximum 5' high at front and side of house, 7' high at rear.

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